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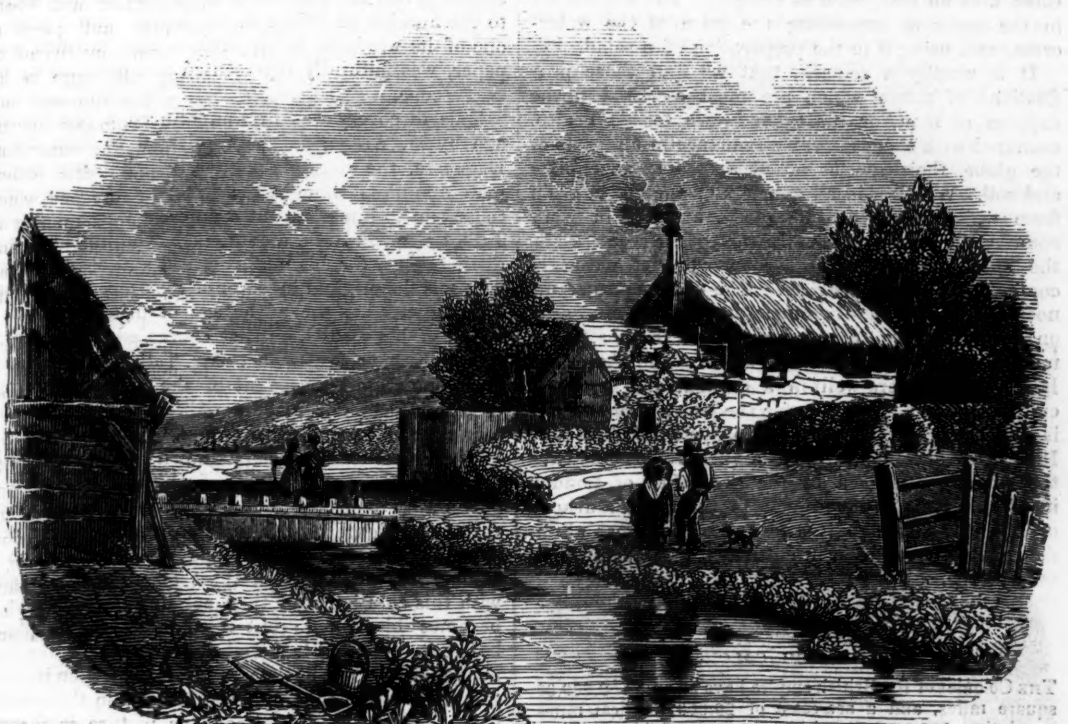
SPRINGHEAD, NEAR NORTHFLEET, KENT.



WATER-CRESS GROUND, AT SPRINGHEAD.

SPRINGHEAD, a pleasantly-situated spot, about a mile and a half from Northfleet, in Kent, close to the small and retired village of Swanscombe, is celebrated for the cultivation of Water-cresses for the supply of the London markets. The quantity of this wholesome vegetable grown expressly for the consumption of the metropolis, is much more extensive than would readily be believed. From Springhead alone two van loads of hampers, containing water-cress, are despatched every day during the Summer, and every other day in the Winter season.

Springhead is the place, near London, where the water-cress was first made the object of cultivation; it was afterwards grown at Mitcham, in Surrey, but the plantation at that place has been neglected. At Springhead about four acres of ground are occupied by the water-cress. At Rickmansworth, and in the neighbourhood of Uxbridge, about fifteen acres are laid down for their growth, and near Waltham Abbey, in Essex, about six acres; but the London market receives considerable supplies from places at a much greater distance, particularly from the neighbourhood of Salisbury, whence they are despatched packed in sacks. The supply from the places we have already mentioned, is brought in hampers, and tied up in bunches. The money received by the wholesale dealers in London is calculated to amount to ten thousand pounds a year; one vender alone, who has received a medal from the Society of Arts for the improvement of water-cress, states his return at fifteen hundred pounds a year.

The attention paid to the growth of the cultivated water-cress, ensures its perfect freedom from the spawn of the small molluscous animals which are found in ditches; and which in the spring of the year, deters so many from the enjoyment of this wholesome addition to the breakfast-table.

At the places we have been describing, the plant is grown in rows on a gravelly bottom, over which a pure stream of clear water, a few inches deep, is constantly flowing: this treatment causes the cress to be fuller in the leaf, and shorter in the stalk, than if it was grown in deeper water or a more confined situation. Close to the building shown in the engraving is a space of water kept entirely clear, and inhabited by a number of beautiful trout; which, from constantly being accustomed to the sight of visiters, are sufficiently tame to allow you to watch their motions with ease, as they boldly move about in the stream.

The scientific name of the water-cress is *Sisymbrium nasturtium,* formerly *Nasturtium aquaticum.* It may be propagated by seeds, or by cuttings from the stem; the root itself is biennial, dying off at the end of the second year, but as fresh fibres spring from each of the upper joints of the stem, it is a matter of no consequence.

The principle on which the pungent taste of the water-cress depends, is extremely volatile, and almost entirely escapes as the leaves dry.

Water-cresses have obtained a place among medical herbs on account of their antiscorbutic qualities, and are considered great purifiers of the blood: in this respect they rank with the celebrated Scurvy-grass of navigators, (*Cochlearia officinalis*) and are recommended by medical authors to be eaten with it as a salad, with the addition of Seville oranges. They are supposed to be always most efficacious when eaten with an acid, such as vinegar. The French are in the habit of expressing the juice of the water-cress, and using it in the preparation of a salad.

It is worthy of remark, that we find those productions of nature which are most essential to the support of man, or most conducive to his health, scattered with the greatest abundance in all parts of the globe, their species varied according to climate and soil. We find, in all quarters of the globe, grain from which bread can be made, but not in every country the same species. In the case of the cresses, the species are very numerous, and yet naturally confined to limited districts. The water-cress seems not peculiar to Great Britain: some species are found on the sea-shore, others on barren heaths, while many will only succeed in water. The American land-cress answers well in a garden, and is worth cultivation, as a substitute for the water-cress. There is one species, (*Sisymbrium trio,*) the London Wild Rocket, respecting which a belief once existed that it was produced by the great fire of London in 1666. It is not confined to the neighbourhood of London, although it grows there in great abundance, but is common in cultivated ground throughout Europe.

THE BRITISH COLONIES.

The Colonies of the British empire have an area of 2,200,000 square miles, and a sea-coast of 20,000 nautical miles; population, 105,000,000, with an average of fifty mouths to the square mile.

Of Lutherans and Calvinists, there are 800,000; of Dissenters, 700,000; of Roman Catholics, Greeks, Syrians, &c., 1,500,000; of Mohammedans, 26,000,000; of Hindoos, &c., 75,000,000.

The military strength employed is, 56,000 European regulars; 156,000 Colonial (coloured) regulars; and 250,000 Colonial militia (whites).

The Colonial revenues amount to 23,000,000*l.* sterling. The civil and convict expenses defrayed by Great Britain, to 225,000*l.*; the military expenses, to 1,800,000*l.*; and the total expenditure of the Colonies is therefore 25,000,000*l.* sterling per annum. The taxation averages 4*s.* 6*d.* per head. The metallic money circulating in the Colonies is about 5,000,000*l.*, and the paper money about 3,000,000*l.* sterling. Maritime commerce of the Colonies: exports, 30,000,000*l.*; imports, 25,000,000*l.* To Great Britain: exports, 15,000,000*l.*; imports, from 10,000,000*l.* Total shipping annually, in and out of Colonial ports, 8,000,000 tons, of which there are to and from Great Britain, 3,000,000 tons. Vessels built in the Colonies, from 1814 to 1837, 8,975; tonnage, 1,022,937.

The property annually created in the Colonies is estimated at 400,000,000*l.*, and the value of the property moveable and immoveable in the transmarine possessions of the empire in land, houses, stock, &c., at 2,500,000,000*l.* sterling.—Martin.

The consciousness of doing that which we are reasonably persuaded we ought to do, is always a gratifying sensation to the considerate mind: it is a sensation by God's will inherent in our nature; and is, as it were, the voice of God Himself, intimating his approval of our conduct, and by his commendation encouraging us to proceed.—Bishop Mant

ON PHOTOGENIC* DRAWING.

At the commencement of the present year, considerable surprise was manifested by the public at the announcement of the startling discovery of a mode, by which natural objects were made to delineate themselves, without the aid of the artist's pencil. The beautiful miniature landscape, which the camera obscura produces, was made to *paint itself upon paper*; and that with a fidelity and minuteness so extraordinary, that a microscopic examination was necessary to bring out all its details. A distant building represented in one of these landscapes was depicted even to the number of bricks in the façade, and a pane of one of its windows being broken and mended with paper, was faithfully represented and detected by the microscope.

This discovery was first announced a few months ago by M. Arago, as communicated to him by M. Daguerre, the dioramic painter, which latter gentleman doubtless thought the discovery to be new, and to pertain to himself; but it appears that Henry Fox Talbot Esq., F. R. S., a gentleman who has long been distinguished for his mathematical and optical discoveries, is the original inventor of the process; although M. Daguerre has the advantage of priority of publication of his results, but has concealed the processes by which they are attained. Mr. Talbot has published both, and from his account of the invention we proceed to inform our readers of the details of this remarkable and valuable invention.

There is a class of salts known to the chemist by the term salts of silver, some of which undergo decomposition by exposure to the solar rays, and become variously coloured. Silver, dissolved in nitric acid, forms a nitrate of the oxide of silver, which is soluble in water. If a sheet of paper be washed with this solution and then set in the sunbeams, it becomes blackened: but if some object be placed before it, which casts a well-defined shadow, the light acting on the rest of the paper would blacken it, while the parts within the shadow would retain their whiteness. Thus a kind of image or picture is formed, resembling the object from which it is derived. But such images must be preserved in the dark, and viewed only by artificial light; because, if viewed by daylight, the same natural processes which formed the images would destroy them by blackening the rest of the paper.

So far this process had long been known. Sir Humphrey Davy and Mr. Wedgwood had investigated the subject, but abandoned it, because the paper, on which the images were depicted, soon became entirely dark, and nothing tried by them would prevent it; but Mr. Talbot was so fortunate as to devise a method of fixing the image in such a manner that it is no more liable to injury from the action of light.

The images obtained by Mr. Talbot's process are themselves white, but the ground upon which they display themselves, is variously and pleasingly coloured. The process, which we shall describe presently, is capable of producing much variety, by merely varying the proportions of the materials employed, and any of the following colours are readily attainable: sky-blue, yellow, rese-colour, various shades of brown, and black. Green alone is absent from the list, with the exception of a dark shade of it, approaching to black. The blue coloured variety has a very pleasing effect, somewhat like that produced by the Wedgwood ware, which has white figures on a blue ground.

The first kind of objects which Mr. Talbot attempted to copy by this process, were flowers and

* From two Greek words, signifying *produced by light*.

leaves. "It is so natural," says he, "to associate the idea of labour with great complexity and elaborate detail of execution, that one is more struck at seeing the thousand florets of an *agrostis*, depicted with all its capillary branchlets (and so accurately, that none of all this multitude shall want its little bivalve calyx, requiring to be examined through a lens), than one is by the picture of the large and simple leaf of an oak or a chestnut. But in truth the difficulty is in both cases the same. The one of these takes no more time to execute than the other; for the object which would take the most skilful artist days or weeks of labour to trace or to copy, is effected by the boundless powers of natural chemistry in the space of a few seconds."

"To give an idea," continues he," "of the degree of accuracy with which some objects can be imitated, by this process, I need only mention one instance. Upon one occasion, having made an image of a piece of lace, of an elaborate pattern, I showed it to some persons at the distance of a few feet, with the inquiry whether it was a good representation; when the reply was that they were not so easily to be deceived, for that it was evidently no picture, but the piece of lace itself."

The reader may probably have heard of one of the legends of that intellectual and extraordinary people, the Germans; where Peter Schlemil sells his shadow, the purchaser of which kneels down in the broad sunshine, detaches the shadow from its owner's heels, folds it up, and puts it in his pocket. By the spells of our scientific enchanter, Mr. Talbot, this most transitory of things, the proverbial emblem of all that is fleeting and momentary, may be permanently fixed in the position which it seemed only destined for a single instant to occupy. Such is the fact, that we may receive on paper the fleeting shadow, arrest it there, and in the space of a single minute, fix it there so firmly as to be no more capable of change, even if thrown back into the sunbeam, from which it derived its origin.

Let us now consider the method of *preparing* what Mr. Talbot calls *photogenic paper*, and the means of *fixing* the design.

A sheet of superfine writing-paper is dipped into a weak solution of common salt, and wiped dry, by which the salt is uniformly distributed throughout its substance. A solution of nitrate of silver is spread over the paper on one surface only, and dried at the fire. The solution should not be saturated, but six or eight times diluted with water. When dry, the paper is fit for use.

There is a certain proportion between the quantity of salt, and that of the solution of silver, which answers best, and gives the maximum effect. If the strength of the salt be increased beyond this point, the effect diminishes, and in certain cases becomes exceedingly small.

"This paper," says Mr. Talbot, "if properly made, is very useful for all ordinary photogenic purposes. For example, nothing can be more perfect than the images it gives of leaves and flowers, especially with a summer sun: the light passing through the leaves delineates every ramification of their nerves."

If a sheet of paper, thus prepared, be washed with a saturated solution of salt, and dried, and again washed with a liberal quantity of the solution of silver, it becomes more sensible to the action of light than it was at first. In this way, by alternately washing the paper with salt and silver, and drying it between times, Mr. Talbot prepares what he calls *sensitive paper*, well adapted to the reception of images formed by the camera-obscura.

The photogenic picture being formed, requires *fixing*; for, if left to the light, the whole surface of the paper which bears it will become of one hue, and the design will of course be obliterated. Two methods of fixing are named by Mr. Talbot; the one is to wash the picture over with a solution of iodide of potassium, whereby an iodide of silver is formed, which is absolutely unalterable by the solar light: the other method is to immerse the picture in a strong solution of common salt, to wipe off the superfluous moisture, and then dry it. Pictures preserved by iodine are of a pale primrose yellow, which possesses the remarkable property of turning to a full gaudy yellow, when exposed to the heat of a fire, and recovering its former colour when it is cold.

The writer of this article has formed several photogenic pictures, with ease and complete success. He will shortly resume the subject, and offer the reader a few directions on the precautions necessary to their formation, and sum up the great advantages which are likely to be derived from this beautiful discovery.

ANCIENT AND MODERN WORKS.

The London and Birmingham Railway is unquestionably the greatest public work ever executed, either in ancient or modern times. If we estimate its importance by the labour alone which has been expended on it, perhaps the Great Chinese Wall might compete with it; but when we consider the immense outlay of capital which it has required,—the great and varied talents which have been in a constant state of requisition during the whole of its progress,—together with the unprecedented engineering difficulties, which we are happy to say are now overcome,—the gigantic work of the Chinese sinks totally into the shade.

It may be amusing to some readers, who are unacquainted with the magnitude of such an undertaking as the London and Birmingham Railway, if we give one or two illustrations of the above assertion. The great Pyramid of Egypt, that stupendous monument which seems likely to exist to the end of all time, will afford a comparison.

After making the necessary allowances for the foundations, galleries, &c., and reducing the whole to one uniform denomination, it will be found that the labour expended on the great Pyramid was equivalent to lifting fifteen thousand seven hundred and thirty-three million cubic feet of stone one foot high. This labour was performed, according to Diodorus Siculus by three hundred thousand, to Herodotus by one hundred thousand men, and it required for its execution twenty years.

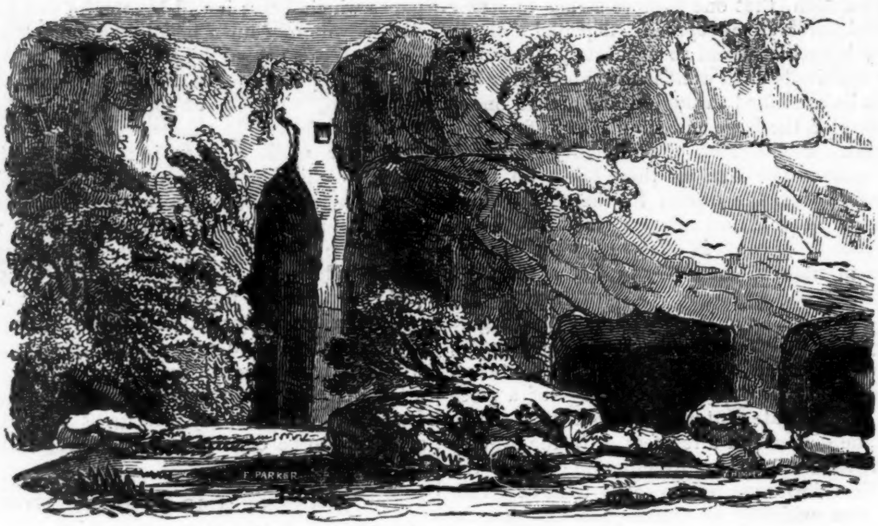
If we reduce in the same manner the labour expended in constructing the London and Birmingham Railway, to one common denomination, the result is twenty-five thousand million cubic feet of material (reduced to the same weight as that used in constructing the Pyramid) lifted one foot high, or nine thousand two hundred and sixty seven million cubic feet more than was lifted one foot high in the construction of the Pyramid; yet this immense undertaking has been performed by about twenty thousand men in less than five years.

From the above calculation have been omitted all the tunnelling, culverts, drains, ballasting, and fencing, and all the heavy work at the various stations, and also the labour expended on engines, carriages, wagons, &c. These are set off against the labour of drawing the materials of the Pyramid from the quarries to the spot where they were to be used—a much larger allowance than is necessary.

As another means of comparison, let us take the cost of the Railway, and turn it into pence, and allowing each penny to be one inch and thirty-four hundredths wide, it will be found that these pence laid together, so that they all touch, would more than form a continuous band round the earth at the equator.

As a third mode of viewing the magnitude of this work, let us take the circumference of the earth in round numbers at one hundred and thirty million feet. Then, as there are about four hundred million cubit feet of earth to be moved in the Railway, we see that this quantity of material alone, without looking to any thing else, would, if spread in a band one foot high and one foot broad, more than three times encompass the earth at the equator.—Lecount.

PHYSIOLOGY OF THE EAR.



THE EAR OF DIONYSIUS.

A hollow cavern seems the general structure of the organ of hearing, as best fitted for receiving and reflecting sound.

So necessary is this cavernous shape of the external ear to the reception of sound, that we are told the celebrated tyrant of Syracuse, Dionysius, caused a cavern to be formed in a rock, corresponding to the shape of a human ear, where he used to confine his state prisoners; and from the strong vibration, and echoes of the sound, he was enabled to learn the secret conversations they held, and thus condemn or acquit them accordingly.

In the different tribes of animals, it is liable to considerable varieties in the appearance and manner of its formation, and its appendages.

In man it is more perfect in its structure than in any other animal; and it is also of more importance to him than to any other of the creation.

All animals, as far as we know, possess this sense: it was formerly doubted with respect to fishes. The organ of hearing in fishes was first discovered by the late Mr. John Hunter; and is prosecuted at considerable length in his work on *The Organ of Hearing in Fishes*, by the late Professor Monro, of Edinburgh. Thus the modern researches and discoveries in comparative anatomy have sufficiently established their possession of this sense, as well as the other classes.

The impressions the organ of hearing receives, are conveyed through the medium of air, which acquires from the action of the body communicating sound, a tremulous motion or vibration: and as these motions or vibrations succeed each other, sound is impressed, or directed, to the thin membrane stretched obliquely across the auditory passage, named the *tympanum*, where it produces a similar motion; which latter motion carried on, excites a corresponding feeling in the mind.

Though *hearing* is more perfect in man than in any other animal, it is not so at the period of birth: an infant at first hears very imperfectly, and only strong sounds.

In all animals the ear is divided into an external and internal part, and the difference in the structure of the organ of hearing is greater in the external ear than in the internal.

In quadrupeds this difference of structure is more conspicuous than in the rest, and this difference or variety seems intended to adapt the animal the better for its particular circumstances or mode of life.

On examining the external ear in quadrupeds, it is found to resemble the oblique section of a cone from near the apex to the base. Hares, and other animals exposed to danger, and liable to be attacked by man or beasts of prey, have large ears, and they are particularly directed backwards, while their eyes at the same time, full and prominent, warn them of any danger in front. Rapacious animals, on the contrary, have their ears placed exactly forwards, as is observable in the lion, the tiger, the cat, and others. Where the peculiar nature of animals is such as to require that sound be distinctly heard from a low situation—as for instance, slow-hounds or others—they will be found to have either large pendulous ears, or to have them flexible, since they move their heads with more difficulty than man.

Much advantage may be taken of this circumstance in the construction of mechanical contrivances for assisting hearing. Some animals keep their head to the ground, as if impressing the sound more strongly on the organ; and in the case of deaf persons, such contrivances should be made nearly of a length to touch the ground, which would give ample compass for the reception and retention of sound.

Fowls, again, differ from quadrupeds in having no external ear; but, in place of it, there is a tuft of very fine feathers, which covers the passage to the ear: this covering allows the sound to pass easily through, and also prevents any insects or external matters, which might prove a source of injury, from getting into it.

To fowls an external ear would have been inconvenient, as causing an obstruction in the course of their flight, in passing through thickets, and other nearly impervious places. In their auditory passage also there is situated a liquor to lubricate it, and from its disagreeable quality, to prevent the entrance of insects.

In prosecuting our inquiries further, the ear has been discovered in insects; it lies at the root of their antenæ, or feelers, and can be distinctly seen in the lobster and some others of the larger kind.

In the sea-tortoise, the frog, and other amphibious animals, its structure is peculiar, by there being no external meatus, but an expanded eustachian tube at

the back part of the roof of the mouth, near where the under and upper jaws articulate.

This tube has a winding course behind the upper jaw, and leads to a cavity resembling the cavity of the human tympanum, covered by the skin of the temple and a tough substance. The latter then passes into the bottom of the tympanum, and next into a smaller cavity filled with a watery humour, and last it opens into a third cavity, having three semicircular canals, and a sac containing a soft cretaceous substance, on the membrane of which are distributed the nerves. Thus making a comparison of it with the human ear, the tough substance, or cartilaginous body, supplies the small bones of our ear, and the membrane, to which it is connected, is analogous to the membrane of the foramen ovale. The sac and semicircular canals and nerves exactly resemble the human labyrinth or internal ear.

On the whole, the more we extend our examination of this organ of hearing, we shall find it so constructed, in every class, as to be peculiarly adapted to the mode of life and other circumstances connected with the situation of the animal.——Curtis.

THE PULPIT ROCKS.

These very remarkable rocks are situated in what is called Bald Eagle, or Sinking Spring Valley, on the frontiers of Bedford County, one of the southern tier of counties in the State of Pennsylvania, and about 200 miles west of the city of Philadelphia. To the east of this valley runs an irregular chain of rocky mountains, (one of the ranges or *spurs* of the Allegheny chain,) known as the Canoe Ridge,—and on the western side it is bounded by the Warrior Mountains, a chain nearly as wild and picturesque as the other.

These rocks, which are of gray limestone, have assumed various strange shapes and appearances (for there are several detached masses through the entire length of Sinking Valley); and notwithstanding the general name of Pulpit Rocks, which is applied to the whole, some of them are rude irregular cones and pyramids, while the forms of others convey to the imagination the ideas of stupendous urns, vases, dishes, &c. Unquestionably they are objects of curiosity, and well worthy the attention of those who can duly appreciate the sublime beauties of nature.

Independent of those natural wonders, Sinking Valley obtained a notoriety during the American revolutionary war, on account of the lead ore that was discovered in some parts of it. But on account of frequent molestation from hostile tribes of Indians, and the want of experience of those engaged in the mines, these lead-works were suffered to fall into a state of decay; nor have they, since that period, been considered of sufficient importance to induce any of the occupiers of the lands to re-open them.

Among the chief curiosities of Sinking Valley are "the Swallows," huge fissures in the wall of rock into which two or three mountain streams pour their transparent waters,—which, after flowing through subterranean passages for several miles, may be seen gushing from gorges in the sides of the mountain, without having apparently undergone any material change in size or character. One these streams is of very considerable size, and is known by the name of the Arch Spring; and as the road leading to the old stockade fort traverses this part of Sinking Valley, it is more generally visited by travellers than any of the rest. After this moderate-sized stream has run a course of several miles in a rocky and irregular channel,—having once or twice disappeared amongst the "swallows," and as often burst forth again from its pent-up course,—it is suddenly precipitated over a succession of ledges in the immediate vicinity of some of the largest of the pulpit rocks, when it almost immediately enters a rude arch, the mouth of a vast and singular cavern. This cave or cavern, where the stream first enters it, is eighteen feet high, the width being nearly the same, which, however, soon expands to nearly double that extent. But, in proportion to its increase of breadth, the roof apparently declines, so that the capacity of the cavern continues nearly the same for a considerable distance.

A ledge of loose irregular rocks runs along one side of the stream as it seeks a dark passage through this cavern. In many places they are elevated a few feet above the level of the water, (except in time of high floods,) and afford those who venture into this gloomy grotto the means of scrambling along, although not without some danger, and very considerable difficulty; but at length the channel of the stream, as well as the direction of the cavern, turns abruptly to the left, when there is no longer any projecting points or ledges that might afford the explorer even a slippery and precarious footing.

The whole length of this chasm, for in several places the cavern has openings or clefts in the roof, is nearly a quarter of a mile; while the fall of the stream in that distance cannot be less than from 50 to 60 feet. There are several ledges of rocks over which it rushes with great velocity; so that the thundering of the various cataracts adds not a little to the wild sublimity of the scene. In some parts of the cavern there are piles of drift-wood, that have been brought down from a distant part of the valley, when this mountain torrent has been swollen by the melting of the winter snows, or by some heavy fall of summer rain. In one place, in particular, where the cave suddenly becomes contracted, there are so many small trees piled up, and the limbs and branches of larger ones, that, judging from the appearance of the sides and roof, it seems quite evident at some former period the whole aperture has been completely filled with water, and that the surplus has escaped by the openings in the roof already mentioned.

In another part of Sinking Valley a stream of smaller size than the one above spoken of, finds a romantic passage in a chasm, which is exceedingly narrow, but of the astonishing depth of 300 feet! In particular situations the water is visible at this extraordinary depth, where it may be seen in constant motion, and of inky blackness; although it is as transparent as crystal both before it enters the chasm, and after it gushes forth once more into open day.

Although there seems little doubt that the small streams which become lost in the upper part of the valley are the identical ones that burst forth again from their subterranean passages, yet many experiments have been tried with various light substances, such as chaff, feather, wool, &c.; and yet there is no instance upon record of the substances thus thrown into the streams *above* the "swallows" being recognised where the water issues from the sundry clefts in the wall of rock along the eastern side of the valley.

Vocal Organs of Birds.—In man, and most of the warm-blooded animals, the larynx, or vocal box, forms a protuberance in the front of the throat; but in birds, the same organ is placed at the bottom of the neck, instead of the top.

WINTER IN LOWER CANADA.

As the Winter approaches, one snow storm succeeds another till the face of the whole country is changed. Every particle of ground is covered, the trees alone remaining visible, while even the progress of the mighty river St. Lawrence is arrested in its course—everywhere, in fact, the chilling grasp of Winter is felt, and every precaution is taken by man to resist its benumbing effects. All the feathered tribes take the alarm—even the hardy crow retreats—and few quadrupeds are to be seen; some, like the bear, remaining in a torpid state; and others, like the hare, changing their colour to a pure white. From Quebec to Montreal the St. Lawrence ceases to be navigable, and serves as a road for the sleighs or carrioles. These vehicles vary in shape, according to fancy. The body of the carriole resembles that of a phaeton, a gig, a chariot, or family coach; it is placed on what are called runners, which resemble in form the irons of a pair of skates, rising up in front in the same manner and for the same purposes. The high runners are about eighteen inches, but generally the carriole is about twelve inches above the snow, over which it glides with great ease, on a level surface, without sinking deep; but when calliots (narrow ridges, with deep furrows) are formed in the snow, the motion is like rowing in a boat against a head-sea, producing a sensation, until accustomed to it, somewhat like sea-sickness. The carriole is often mounted with silver, and ornamented with expensive furs.

Instead of the variety which a Canadian Summer presents, in tracing the course of noble rivers, the fall of beautiful cataracts, &c., nothing is now to be seen but one continued solid plain; no rivers, no ships, no animals—all one indiscriminate plain of snow, the average depth of which, (unless where accumulated by snow-storms or drifts,) is about thirty inches.

The dress of the Canadians now undergoes a complete change; the hat and bonnet rouge are thrown aside, and fur caps, fur cloaks, fur gloves, are put in requisition, with worsted hose over as well as under boots: those who take exercise on foot use snow-shoes, or mocassins, which are made of a kind of network, fixed on a frame, and shaped like a boy's paper kite, about two feet long, and eighteen inches broad; these cover so much of the surface of the snow, that the wearer sinks but a very few inches, even where the snow is softest. While the external weather is guarded against by the Canadians when out of doors, their habitations are also secured against the destructive power of intense cold. The walls of the houses are usually plastered on the outside, to preserve the stones from moisture, which, if acted on by the frost, is liable to split them; and the apartments are heated with stoves, which keep the temperature at a higher and more uniform rate than our English fire-places. It has been found difficult to get the plaster to adhere, particularly if exposed to the easterly wind; but, by mixing two pounds of Muscovado sugar with a bushel of lime, a hard and durable rough casting is produced.—MARTIN'S *Colonies.*

SCIENCE deprives itself of its right hand, when, under the influence of a false philosophy, it refuses to turn to the Creator and to inquire of His purposes.—MACCULLOCH.

FROGS.—Before the common frog becomes perfectly developed, it is four years old. Three years are required for the common white grub-worm, found in the deep soil of a garden, to pass through the requisite changes to become a perfect insect.

MY YEARS.

I AM not what I was. I feel these years
Have done sad office for me; and that time,
Which I had dreamed might fling around the path
On which I ventured, something of that light
Which cheers life like a halo, has but cast
A sickly shadow o'er my pilgrimage,
And made thus far what I had deemed should be
A course for men to point at and admire,
Only an upward strife of weariness—
A struggle with dark destiny—a toil
In which I've given no lesson to the world
Of that stern toleration which sets crown
On virtue in her trial; because here
I've poured my spirit out in dull complaint,
That should have striven for mastery!

I see
Through the pale vista of my memory,
What once I was, compared with what I am.
I once was buoyant, and my footstep rose
To something strong within me. I gave voice
As in uplifting music, to high thoughts
That spoke of a high nature, that should rise,
So it were true to Him who fashioned it,
Onward, in lofty march up to the skies;
Or, were it faithless, downward to the dust
Our graves are made of! I was certain, then,
There was no power could lure my eye from heaven,
Or that a cloud upon the things of earth
Could come, than midnight quicker and more deep!
But I have found my reason was a child
Without a master—a mere wanderer—
Untaught and learning nothing—till my days
Brought something that reproved me as it passed;
A strong, rebuking spirit, whose dark wings,
Heavy with sorrow, swept but slowly by,
And held me in long shadow, like a night!
Thus was it that I found a punishment
Brought by my years, for giving to the earth
What with my young vows should have gone to God!

'Tis not mine to forget. Yet can I not
Remember what I would, or what were well!
Memory plays tyrant with me, by a wand
I cannot master. I may not forget
My visitations, that have shadowed me
Like an eclipse; until my tortured heart
Was weakened like a child's; and like a child's
Scarce knew its duty in its feebleness.
Forgetfulness of sorrow is not mine,
But on me rests remembrance like a ban;
Yet like the flash that plays upon the cloud
In the night season, memory will unveil,
Though for a moment, some dim passages
Of my passed, palled existence. I can see,
As in a dream, how life was when I sprang
Into its highway for the agony
And strain of high contention. I can see
Beyond a vision's clearness, how I went
Cheered as the lark is, to the upper sky
By the unbarring morning; so by shouts
Of men, as they broke round me, in *my* morn:
Life was a panorama of high hope—
A prospect of high travel, and great fame.
I saw upon the future, painted nought
That looked like frowns upon repelling brows,
But only hands that seemed to beckon on
In a still, strange temptation, that my eye
Grew mad with, till the colours of this earth
Took hue like those of heaven; and I forgot
It was the destiny of one to fade,
And that my love was given to! But my years
Here, too, brought knowledge; in that company
Of sadness and repentance, whose dim train
Sweeps on so with experience, that they seem
Like manacled and cowled captives at the car
Of some unmoved and stayless conqueror!

And now how gaze I on that memory
Of that first page I turned for lessons here!
My prayer is to forget the dreamy past—
And senseless to the present, to look on,
And upward with a better constancy,
And holier aspiration, till rebuke

Is merged in mercy, and I feel the clouds
Are bending to receive me, like great wings,
To waft me to the mighty tabernacle
That they are round about.—GRENVILLE MELLEN.

ON THE EARLY MODES OF MEASURING TIME.

No. V. THE SAND OR HOUR-GLASS.

WE find in ancient writings the term *Clepsydra* translated by the word *Hour-glass*; and, as this latter term is now applied to the sand-glass, it leaves us in great uncertainty as to when the flowing of sand was first made a measure of time. Fosbrooke, in his "Encyclopædia of Antiquities," says, that in a basso relievo, at the Mattei palace, representing the marriage of Thetis and Peleus, Morpheus holds an hour-glass in his hand. He also says, on the authority of Atheneus, that people used to carry hour-glasses about as we do watches.

Instead of endeavouring to trace when and where sand-glasses were first employed, we will proceed to give a few practical details concerning them, merely premising that they served their purpose tolerably well, until more useful,—because to a greater extent self-acting,—instruments superseded a contrivance which required at least a horary attendant. The hour-glass is now seldom seen, unless upon the table of the lecturer or private teacher, in the study of the philosopher, the cottage of the peasant, or in the hand of the old emblematic figure of Time, accompanied by the equally emblematic scythe. The half-minute glass is still employed on board-ship, and the three-minute glass is well known under the appellation of an egg-glass, to regulate the time for boiling an egg.

The shape of the hour-glass is not a matter of much moment, but the form generally adopted is that of two pear-shaped vessels, joined at their smaller extremities. These vessels are blown of equal size, and the sand is placed in one of them before the other is joined to it. The best sand is that called *Silver sand*, which, being heated in a crucible or common frying pan to expel all moisture, is then sifted through a fine sieve. A given measure or weight of the sand (known by experience) is then put into one of the bulbs, and the small extremities of the two bulbs are fused together by means of a blow-pipe, in such a manner as to leave a small aperture between the two bulbs, the calibre of which aperture determines the rapidity of the flow of the sand. The bulbs are fixed vertically between two flat pieces of wood, connected together by pillars, and the instrument is now fit for use: the sand falling from the upper to the lower bulb, in exactly the time for which the measure of sand and size of the aperture were calculated.

A method practised in France for constructing sand-glasses is as follows:—Blow four bulbs from one piece of glass tube, so that they may be all connected together in one line, with a narrow length of tube between each two bulbs. Open the two extreme bulbs in the form of a funnel, which may act as pedestals for the instrument to stand upon. Close the narrow opening at one end, introduce the sand at the other, and then close that opening likewise, having previously adjusted the tube which connects the two middle bulbs, so that the sand shall flow with the desired rapidity,

Steady as Truth on either end
Its hourly task performing well.

Egg shell, baked and finely powdered, has been recommended as serving better than sand for these instruments.

The hour-glass is much superior to the clepsydra as a measurer of time; for the flow of the sand from one bulb to another is perfectly equable, whatever be the quantity of sand in the upper bulb: the stream runs no faster when this bulb is almost full than when nearly empty; whereas with water the effect is, as we saw in the last paper, quite the reverse. Until we properly estimate the effects of friction, we are likely to suppose that, when the upper bulb is full, the pressure of sand from above urges the stream more quickly through the aperture at the beginning of the hour than towards the end. That this is not the case, but that the flow of the sand is equable, may be shown by an easy and very pretty experiment.

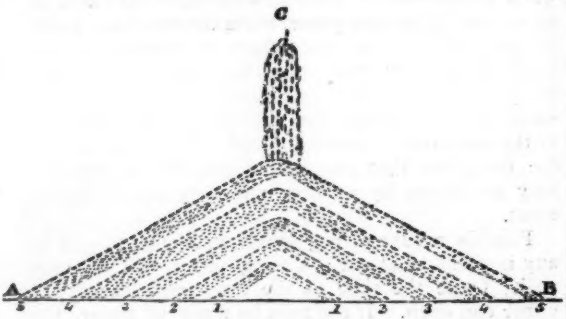
Provide a tube of any length or diameter, and of any material whatever: writing paper will do very well. Close the tube at the lower end, leaving the upper end open. If the tube be made of paper, the best way to construct it is to choose a cylindrical mould, such as a common round ruler, round which roll the paper, and connect the edges with glue or paste. Tie a string round the whole in two or three places, to prevent the paper from starting. When the glue or paste is dry, remove the string and draw out the cylinder; then cover one extremity with a piece of paper, as thin as may be preferred: this may be tied on, or only wetted, so as to adhere by clinging round the bottom of the tube.

Make a hole, about one-eighth of an inch in diameter, in this bottom of the tube: cover this hole tightly with the finger, and then fill up the tube with sand fine and dry: suspend the tube in a vertical position, and remove the finger from the hole, and let the sand flow out into any little vessel which will serve as a measure of capacity. Note the time when the sand begins to flow, and how long time is required to fill this vessel once. When the measure is quite full, stop the flow of sand by covering the hole again, empty the measure, and then allow it to be filled again. It will be found that the time required to fill the measure is precisely the same in both cases, whatever be the extent of the column in the upper part of the tube.

Or, equal measures of sand may in the first place be poured into the tube, say four equal measures: if a quantity of sand, equal to one measure, flow out in a quarter of an hour, we may with certainty predict that three-quarters of an hour will be required for the remainder of the sand to flow out. Or, the tube itself may be graduated into equal parts, and the fall of the sand through one division will be performed in the same time as through any other division of the tube.

While the sand is flowing (provided the tube be made of strong material which will bear rough handling) we may exert whatever pressure we please upon the upper surface of the sand in the tube: we may take a ruler or plug, and force the sand down with our whole strength;—but we shall find that the flow of the sand will not be in the least hastened by that pressure; it will flow on calmly and equably, regardless of the exertions we are making to hasten its progress; but we must not disturb the steadiness of the tube, but fix it firmly in the first case, and make all the comparisons fairly and carefully. If any person have a pop-gun, let him close one end with his finger, and then fill the tube with sand: he will find that not all the force which he can exert at the other end with his rammer will produce the slightest pressure on his finger, or thrust any of the sand out of the tube.

It has been observed, that "it requires a good deal of philosophy to observe common things;" and this remark, so generally true, applies to the present subject. When sand is allowed to fall quietly upon any surface, it forms a conical heap, whose sides form with the base an angle of about 30°: thus, in the following figure, sand falling upon a surface A B from



C, a source above, forms at first the small cone 1 1, which increases to 2 2, 3 3, &c., the sand constantly falling down a conical surface, whose inclination is 30°. A similar fact may be observed wherever mortar is being made. Sand, one of the ingredients of mortar, is sifted through a screen, placed at an angle of about 40° or 50°, and falling through the meshes of the sieve, forms a conical heap on the other side; not so regular as in its steadier flow through a simple hole, but still its angle will be generally about 30°. When sand is tossed out of a cart, or barrow, it falls in the form of this cone.

As sand, therefore, falls at a given angle, it is easy to see the form which it occupies in the tube. The latter is filled by a succession of conical heaps: its bottom bears the pressure of the first heap only; the subsequent strata or additions to that heap transferring their pressure almost entirely to the sides of the tube.

The reason then why the sand flows so equably is, because the lowest heap is not influenced by the pressure of the overlaying strata.

We can easily prove that the base of the tube, before spoken of, supports the pressure of the first conical heap only, by again taking the open tube, and closing the bottom end with a piece of silver paper, wetted at the edges, which are to be folded up on the outside of the tube. If the tube be now filled with sand, it will be found that even this slightly adhering bottom is sufficient to retain the sand in the tube: indeed the only weight the silver paper sustains is the first little heap of sand poured into the tube. In this way many pounds of sand, contained within a tube two or three inches in diameter, may be lifted up from the ground.

With respect to these remarkable properties elicited by the flowing of sand, M. Bournaud observes, that "there is, perhaps, no other natural force on the earth which produces by itself a perfectly uniform movement, and which is not altered either by gravitation, or friction, or resistance of the air; for the height has no influence,—friction, instead of being an obstacle, is the regulating cause,—and the resistance of the air within the column must be so feeble, as to be altogether insensible as a disturbing force."

This curious property of sand disqualifies it for a purpose for which it has been proposed to employ it. Suggestions have been made to naturalists, to load their guns with water instead of bullets, in order to prevent that mutilation of the plumage of birds, &c., of which they are in search. This plan was first adopted by Le Vailliant, in South America, with great success; and sand has been recommended for the same purpose. We do not know whether this latter has been adopted; but, from the foregoing experiments it will be seen how extremely hazardous must be such a trial: the almost certain result would be the bursting of the gun-barrel, inasmuch as a very small quantity of sand would resist the expansive force of the ignited gunpowder.

But this plan has been adopted with much success in blasting rocks. A hole is bored in the rock to the requisite depth, at the bottom of which gunpowder is placed. A long match is then inserted into the hole down to the gunpowder; the whole of it is then filled up with sand: the match is lighted, and burns down to the powder; which, being ignited, the expansive force rends away the rock. It is worthy of remark, and is indeed the point to which we especially allude, that the loose column of sand is not blown out during the explosion.

These properties of solid bodies, when in the form of fine sand or grains, are so remarkable that we have been induced to deviate from the course of our subject to say a few words respecting them. To return, however, we may state that preaching by the hour-glass, was an ancient custom in this country, and still exists in Scotland. So many allusions to the hour-glass are to be met with in the early writers, that it is evident they were in common use. Bacon says, "In sickness, time will seem longer without a clock or hour-glass than with one; for the mind doth value every moment:" and in the words of Sidney, "Next morning, known to be a morning better by the hour-glass, than the day's clearness."

These relics of the olden time, however, as well as sun-dials and clepsydras, have gradually yielded to clocks and watches; and we will conclude by quoting a passage of a quaint writer in the seventeenth century, introductory to a description of the clocks in use at that period.

As time, that little part of eternity, in which the sun shall continue to run his race, is divided naturally into years and days, by the two different motions of that luminous body; so mankind has, by divine direction, been induced to divide the day into yet lesser parts, called hours and minutes; and, as the exceeding great use and benefit thereof is now known to many nations, so, in the most civilized parts of the world, men have been still contriving ways how they may do this with the greatest exactness.

The first and most ancient of all was doubtless that of sun-dials; a noble invention but yet defective, in that it is of use no longer than the sun shines. The next to this, of any value and esteem, was that of the hour-glass, an excellent contrivance, if its usefulness at all times be considered; but the care required to keep it in continual motion did still excite the ingenious to endeavour the discovery of something else that might not only be yet more exact, but free too from the continual toil, as I may call it, and trouble of attendance.—SMITH'S *Horological Disquisitions*, 1694.

DIFFERENCE BETWEEN AN ALLIGATOR AND A CROCODILE.

THE *true crocodile* is found in the river Nile, but by no means in such plenty as in the times of the Pharaohs. The species which is domesticated by the priests, and magnificently provided for in a temple in Memphis, was of a green colour. It was an object of profound worship, called a God, and embalmed when it died. On the other hand, the *alligator* is exclusively found in America; and instead of having an uninterrupted series of teeth round both jaws, as in the crocodile, the fourth tooth of the under jaw shuts into a corresponding socket in the upper one. This law is so universal, that any person by remembering this fact, may with certainty designate the one from the other.

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